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Oakhurst Dairy – New Milk Cooler**SECTION 13915 - FIRE-SUPPRESSION PIPING****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

**1.2 SUMMARY**

- A. This Section includes the following fire-suppression piping inside the building:
  - 1. Dry-pipe sprinkler systems.
- B. Related Sections include the following:
  - 1. Division 2 Section "Water Distribution" for piping outside the building.

**1.3 SYSTEM DESCRIPTIONS**

- A. Dry-Pipe Sprinkler System: Automatic sprinklers are attached to piping containing compressed air. Opening of sprinklers releases compressed air and permits water pressure to open dry-pipe valve. Water then flows into piping and discharges from opened sprinklers.

**1.4 PERFORMANCE REQUIREMENTS**

- A. Fire-suppression sprinkler system design shall be approved by authorities having jurisdiction.
  - 1. Total Combined Hose-Stream Demand Requirement: According to NFPA 13, unless otherwise indicated:
    - a) Light-Hazard Occupancies: 100 gpm for 30 minutes.
    - b) Ordinary-Hazard Occupancies: 250 gpm for 90 minutes.

**1.5 SUBMITTALS**

- A. Product Data: For the following:
  - 1. Valves, including listed fire-protection valves, unlisted general-duty valves, and specialty valves and trim.
  - 2. Air compressors, including electrical data.
  - 3. Sprinklers, escutcheons, and guards. Include sprinkler flow characteristics, mounting, finish, and other pertinent data.
  - 4. Hose connections, including size, type, and finish.
  - 5. Hose stations, including size, type, and finish of hose connections; type and length of fire hoses; finish of fire hose couplings; type, material, and finish of nozzles; and finish of rack.
  - 6. Fire department connections, including type; number, size, and arrangement of inlets; caps and chains; size and direction of outlet; escutcheon and marking; and finish.
  - 7. Alarm devices, including electrical data.

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- B. Shop Drawings: Diagram power, signal, and control wiring.
- C. Fire-hydrant flow test report.
- D. Approved Sprinkler Piping Drawings: Working plans, prepared according to NFPA 13, that have been approved by authorities having jurisdiction, including hydraulic calculations.
- E. Field Test Reports and Certificates: Indicate and interpret test results for compliance with performance requirements and as described in NFPA 13. Include "Contractor's Material and Test Certificate for Aboveground Piping" and "Contractor's Material and Test Certificate for Underground Piping."
- F. Operation and Maintenance Data: For sprinkler specialties to include in emergency, operation, and maintenance manuals.

**1.6 QUALITY ASSURANCE**

- A. Installer Qualifications:
  - 1. Installer's responsibilities include designing, fabricating, and installing fire-suppression systems and providing professional engineering services needed to assume engineering responsibility. Base calculations on results of fire-hydrant flow test.
- B. NFPA Standards: Fire-suppression-system equipment, specialties, accessories, installation, and testing shall comply with the following:
  - 1. NFPA 13, "Installation of Sprinkler Systems."
  - 2. NFPA 14, "Installation of Standpipe, Private Hydrant, and Hose Systems."
  - 3. NFPA 24, "Installation of Private Fire Service Mains and Their Appurtenances."
  - 4. NFPA 230, "Fire Protection of Storage."

**1.7 COORDINATION**

- A. Coordinate layout and installation of sprinklers with other construction that penetrates ceilings, including light fixtures, HVAC equipment, and partition assemblies.
- B. Provide contacts for remote enunciation of alarm for fail conditions to the building fire and security system being provided by owner.

**1.8 EXTRA MATERIALS**

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Sprinkler Cabinets: Finished, wall-mounting, steel cabinet with hinged cover, with space for minimum of six spare sprinklers plus sprinkler wrench. Include number of sprinklers required by NFPA 13 and sprinkler wrench. Include separate cabinet with sprinklers and wrench for each type of sprinkler on Project.

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Oakhurst Dairy – New Milk Cooler**PART 2 - PRODUCTS****2.1 MANUFACTURERS**

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
  2. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

**2.2 DUCTILE-IRON PIPE AND FITTINGS**

- A. Mechanical-Joint, Ductile-Iron Pipe: AWWA C151, with mechanical-joint bell end and plain end.
1. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern.
  2. Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron gland, rubber gasket, and steel bolts and nuts.

**2.3 STEEL PIPE AND FITTINGS**

- A. Threaded-End, Standard-Weight Steel Pipe: ASTM A 53/A 53M, ASTM A 135, or ASTM A 795, hot-dip galvanized where indicated and with factory- or field-formed threaded ends.
1. Cast-Iron Threaded Flanges: ASME B16.1.
  2. Malleable-Iron Threaded Fittings: ASME B16.3.
  3. Gray-Iron Threaded Fittings: ASME B16.4.
  4. Steel Threaded Pipe Nipples: ASTM A 733, made of ASTM A 53/A 53M or ASTM A 106, Schedule 40, seamless steel pipe hot-dip galvanized where indicated. Include ends matching joining method.
  5. Steel Threaded Couplings: ASTM A 865 hot-dip galvanized-steel pipe where indicated.
- B. Grooved-End, Standard-Weight Steel Pipe: ASTM A 53/A 53M, ASTM A 135, or ASTM A 795, hot-dip galvanized where indicated and with factory- or field-formed, square-cut- or roll grooved ends.
1. Grooved-Joint Piping Systems:
    - a) Available Manufacturers:
      - 1) Anvil International, Inc.
      - 2) Central Sprinkler Corp.
      - 3) Ductilic, Inc.
      - 4) JDH Pacific, Inc.
      - 5) National Fittings, Inc.
      - 6) Shurjoint Piping Products, Inc.
      - 7) Southwestern Pipe, Inc.

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- 8) Star Pipe Products; Star Fittings Div.
- 9) Victaulic Co. of America.
- 10) Ward Manufacturing.
- b) Grooved-End Fittings: UL-listed, ASTM A 536, ductile-iron casting with OD matching steel-pipe OD.
- c) Grooved-End-Pipe Couplings: UL 213 and AWWA C606, rigid pattern, unless otherwise indicated; gasketed fitting matching steel-pipe OD. Include ductile-iron housing with keys matching steel-pipe and fitting grooves, rubber gasket listed for use with housing, and steel bolts and nuts.

**2.4 SPRINKLER SPECIALTY FITTINGS**

- A. Sprinkler specialty fittings shall be UL listed or FMG approved, with 175-psig minimum working-pressure rating, and made of materials compatible with piping. Outlet Specialty Fittings:
  - 1. Available Manufacturers:
    - a) Anvil International, Inc.
    - b) Central Sprinkler Corp.
    - c) Ductilic, Inc.
    - d) JDH Pacific, Inc.
    - e) National Fittings, Inc.
    - f) Shurjoint Piping Products, Inc.
    - g) Southwestern Pipe, Inc.
    - h) Star Pipe Products; Star Fittings Div.
    - i) Victaulic Co. of America.
    - j) Ward Manufacturing.
  - 2. Mechanical-T and -Cross Fittings: UL 213, ductile-iron housing with gaskets, bolts and nuts, and threaded, locking-lug, or grooved outlets.
  - 3. Snap-On and Strapless Outlet Fittings: UL 213, ductile-iron housing or casting with gasket and threaded outlet.
- B. Sprinkler Drain and Alarm Test Fittings: Cast- or ductile-iron body; with threaded or locking-lug inlet and outlet, test valve, and orifice and sight glass.
  - 1. Available Manufacturers:
    - a) Central Sprinkler Corp.
    - b) Fire-End and Croker Corp.
    - c) Viking Corp.
    - d) Victaulic Co. of America.
- C. Sprinkler Branch-Line Test Fittings: Brass body with threaded inlet, capped drain outlet, and threaded outlet for sprinkler.
  - 1. Available Manufacturers:
    - a) Elkhart Brass Mfg. Co., Inc.
    - b) Fire-End and Croker Corp.
    - c) Potter-Roemer; Fire-Protection Div.

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- D. Sprinkler Inspector's Test Fitting: Cast- or ductile-iron housing with threaded inlet and drain outlet and sight glass.
  - 1. Available Manufacturers:
    - a) AGF Manufacturing Co.
    - b) Central Sprinkler Corp.
    - c) G/J Innovations, Inc.
    - d) Triple R Specialty of Ajax, Inc.
- E. Drop-Nipple Fittings: UL 1474, adjustable with threaded inlet and outlet, and seals.
  - 1. Available Manufacturers:
    - a) CECA, LLC.
    - b) Merit.
- F. Dry-Pipe-System Fittings: UL listed for dry-pipe service.

**2.5 LISTED FIRE-PROTECTION VALVES**

- A. Valves shall be UL listed or FMG approved, with 175-psig minimum pressure rating.
- B. Ball Valves: Comply with UL 1091, except with ball instead of disc.
  - 1. NPS 1-1/2 and Smaller: Bronze body with threaded ends.
  - 2. NPS 2 and NPS 2-1/2: Bronze body with threaded ends or ductile-iron body with grooved ends.
  - 3. NPS 3: Ductile-iron body with grooved ends.
  - 4. Available Manufacturers:
    - a) NIBCO.
    - b) Victaulic Co. of America.
- C. Butterfly Valves: UL 1091.
  - 1. NPS 2 and Smaller: Bronze body with threaded ends.
    - a) Available Manufacturers:
      - 1) Global Safety Products, Inc.
      - 2) Milwaukee Valve Company.
  - 2. NPS 2-1/2 and Larger: Bronze, cast-iron, or ductile-iron body; wafer type or with flanged or grooved ends.
    - a) Available Manufacturers:
      - 1) Central Sprinkler Corp.
      - 2) Global Safety Products, Inc.
      - 3) McWane, Inc.; Kennedy Valve Div.
      - 4) Mueller Company.
      - 5) NIBCO.
      - 6) Pratt, Henry Company.
      - 7) Victaulic Co. of America.

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- D. Check Valves NPS 2 and Larger: UL 312, swing type, cast-iron body with flanged or grooved ends.
1. Available Manufacturers:
    - a) AFAC Inc.
    - b) American Cast Iron Pipe Co.; Waterous Co.
    - c) Central Sprinkler Corp.
    - d) Clow Valve Co.
    - e) Crane Co.; Crane Valve Group; Crane Valves.
    - f) Crane Co.; Crane Valve Group; Jenkins Valves.
    - g) Firematic Sprinkler Devices, Inc.
    - h) Globe Fire Sprinkler Corporation.
    - i) Grinnell Fire Protection.
    - j) Hammond Valve.
    - k) Matco-Norca, Inc.
    - l) McWane, Inc.; Kennedy Valve Div.
    - m) Mueller Company.
    - n) NIBCO.
    - o) Potter-Roemer; Fire Protection Div.
    - p) Reliable Automatic Sprinkler Co., Inc.
    - q) Star Sprinkler Inc.
    - r) Stockham.
    - s) United Brass Works, Inc.
    - t) Venus Fire Protection, Ltd.
    - u) Victaulic Co. of America.
    - v) Watts Industries, Inc.; Water Products Div.
- E. Gate Valves: UL 262, OS&Y type.
1. NPS 2 and Smaller: Bronze body with threaded ends.
    - a) Available Manufacturers:
      - 1) Crane Co.; Crane Valve Group; Crane Valves.
      - 2) Hammond Valve.
      - 3) NIBCO.
      - 4) United Brass Works, Inc.
  2. NPS 2-1/2 and Larger: Cast-iron body with flanged ends.
    - a) Available Manufacturers:
      - 1) Clow Valve Co.
      - 2) Crane Co.; Crane Valve Group; Crane Valves.
      - 3) Crane Co.; Crane Valve Group; Jenkins Valves.
      - 4) Hammond Valve.
      - 5) Milwaukee Valve Company.
      - 6) Mueller Company.
      - 7) NIBCO.
      - 8) Red-White Valve Corp.
      - 9) United Brass Works, Inc.

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Oakhurst Dairy – New Milk Cooler**2.6 UNLISTED GENERAL-DUTY VALVES**

- A. Ball Valves NPS 2 and Smaller: MSS SP-110, 2-piece copper-alloy body with chrome-plated brass ball, 600-psig minimum CWP rating, blowout-proof stem, and threaded ends.
- B. Check Valves NPS 2 and Smaller: MSS SP-80, Type 4, Class 125 minimum, swing type with bronze body, nonmetallic disc, and threaded ends.
- C. Gate Valves NPS 2 and Smaller: MSS SP-80, Type 2, Class 125 minimum, with bronze body, solid wedge, and threaded ends.
- D. Globe Valves NPS 2 and Smaller: MSS SP-80, Type 2, Class 125 minimum, with bronze body, nonmetallic disc, and threaded ends.

**2.7 SPECIALTY VALVES**

- A. Sprinkler System Control Valves: UL listed or FMG approved, cast- or ductile-iron body with flanged or grooved ends, and 175-psig minimum pressure rating.
  - 1. Available Manufacturers:
    - a) AFAC Inc.
    - b) Central Sprinkler Corp.
    - c) Firematic Sprinkler Devices, Inc.
    - d) Globe Fire Sprinkler Corporation.
    - e) Grinnell Fire Protection.
    - f) Reliable Automatic Sprinkler Co., Inc.
    - g) Star Sprinkler Inc.
    - h) Venus Fire Protection, Ltd.
    - i) Victaulic Co. of America.
    - j) Viking Corp.
  - 2. Alarm Check Valves: UL 193, designed for horizontal or vertical installation, with bronze grooved seat with O-ring seals, single-hinge pin, and latch design. Include trim sets for bypass, drain, electrical sprinkler alarm switch, pressure gages, and fill-line attachment with strainer.
    - a) Drip Cup Assembly: Pipe drain without valves and separate from main drain piping.
    - b) Retain subparagraph above or first subparagraph below. Retain above with retarding chamber, or retain below if retarding chamber is deleted from "Alarm Check Valves" Subparagraph above.
    - c) Drip Cup Assembly: Pipe drain with check valve to main drain piping.
  - 3. Dry-Pipe Valves: UL 260, differential type; with bronze seat with O-ring seals, single-hinge pin, and latch design. Include UL 1486, quick-opening devices, trim sets for air supply, drain, priming level, alarm connections, ball drip valves, pressure gages, priming chamber attachment, and fill-line attachment.
    - a) Air Compressor: UL 753, fractional horsepower, 120-V ac, 60 Hz, single phase.
      - 1) Available Manufacturers:
        - (a) AFAC Inc.

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- (b) Gast Manufacturing, Inc.
- (c) Grinnell Fire Protection.
- (d) Reliable Automatic Sprinkler Co., Inc.
- (e) Viking Corp.

- B. Automatic Drain Valves: UL 1726, NPS 3/4, ball-check device with threaded ends.
  - 1. Available Manufacturers:
    - a) AFAC Inc.
    - b) Grinnell Fire Protection.

**2.8 CONTROL PANELS**

- A. Description: Single-area, two-area, or single-area cross-zoned type control panel as indicated, including NEMA ICS 6, Type 1 enclosure, detector, alarm, and solenoid-valve circuitry for operation of deluge valves. Panels contain power supply; battery charger; standby batteries; field-wiring terminal strip; electrically supervised solenoid valves and polarized fire alarm bell; lamp test facility; single-pole, double-throw auxiliary alarm contacts; and rectifier.
  - 1. Panels: UL listed. Electrical characteristics are 120-V ac, 60 Hz, with 24-V dc rechargeable batteries.

**2.9 SPRINKLERS**

- A. Sprinklers shall be UL listed or FMG approved, with 175-psig minimum pressure rating.
- B. Available Manufacturers:
  - 1. AFAC Inc.
  - 2. Central Sprinkler Corp.
  - 3. Firematic Sprinkler Devices, Inc.
  - 4. Globe Fire Sprinkler Corporation.
  - 5. Grinnell Fire Protection.
  - 6. Reliable Automatic Sprinkler Co., Inc.
  - 7. Star Sprinkler Inc.
  - 8. Venus Fire Protection, Ltd.
  - 9. Victaulic Co. of America.
  - 10. Viking Corp.
- C. Automatic Sprinklers: With heat-responsive element complying with the following:
  - 1. UL 199, for nonresidential applications.
- D. Sprinkler Types and Categories: Nominal 1/2-inch orifice for "Ordinary" temperature classification rating, unless otherwise indicated or required by application.
  - 1. Open Sprinklers: UL 199, without heat-responsive element.
    - a) Orifice: 1/2 inch, with discharge coefficient K between 5.3 and 5.8.



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- b) Orifice: 17/32 inch, with discharge coefficient K between 7.4 and 8.2.
- E. Sprinkler types, features, and options as follows:
  - 1. Pendent sprinklers.
  - 2. Sidewall sprinklers.
  - 3. Upright sprinklers.
- F. Sprinkler Finishes: Chrome plated and bronze.
- G. Sprinkler Escutcheons: Materials, types, and finishes for the following sprinkler mounting applications. Escutcheons for concealed, flush, and recessed-type sprinklers are specified with sprinklers.
  - 1. Ceiling Mounting: Chrome-plated steel, one piece, flat.
  - 2. Sidewall Mounting: Chrome-plated steel one piece, flat.
- H. Sprinkler Guards: Wire-cage type, including fastening device for attaching to sprinkler.

**2.10 HOSE STATIONS**

- A. Available Manufacturers:
  - 1. AFAC Inc.
  - 2. American Fire Hose Cabinet Co.
  - 3. Angus Fire, Inc.
  - 4. Brooks Equipment Co., Inc.
  - 5. Elkhart Brass Mfg. Co., Inc.
  - 6. Fire-End and Croker Corp.
  - 7. GMR International Equipment Corporation.
  - 8. Potter-Roemer; Fire-Protection Div.
- B. Description: UL 47, automatic class III hose stations. Include brass rack nipple, hose rack, and the following:
  - 1. Valve: UL 668, brass or bronze, 300-psig minimum pressure rating, 90-degree-angle-pattern hose valve with female NPS inlet and outlet, unless otherwise indicated.
  - 2. Threads and Gaskets: NFPA 1963 and matching local fire department threads.
  - 3. Fire Hose: NFPA 1961 and UL 219, lined fire hose with couplings, gaskets, and nozzle.
  - 4. Nozzles: UL 401.
  - 5. Drain Valves: UL 1726.
  - 6. Mountings: Pipe clamp or wall bracket.

**2.11 FIRE DEPARTMENT CONNECTIONS**

- A. Available Manufacturers:
  - 1. AFAC Inc.

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2. Central Sprinkler Corp.
  3. Elkhart Brass Mfg. Co., Inc.
  4. Fire-End and Croker Corp.
  5. Fire Protection Products, Inc.
  6. GMR International Equipment Corporation.
  7. Guardian Fire Equipment Incorporated.
  8. Potter-Roemer; Fire-Protection Div.
  9. Reliable Automatic Sprinkler Co., Inc.
  10. United Brass Works, Inc.
- B. Wall-Type, Fire Department Connection: UL 405, 175-psig minimum pressure rating; with corrosion-resistant-metal body with brass inlets, brass wall escutcheon plate, brass lugged caps with gaskets and brass chains, and brass lugged swivel connections. Include inlets with threads and connections approved by the local fire company, check devices or clappers for inlets, and escutcheon plate with marking similar to "AUTO SPKR & STANDPIPE."
1. Type: Exposed, projecting, with two inlets and round escutcheon plate.
  2. Finish: Polished brass.

**2.12 ALARM DEVICES**

- A. Alarm-device types shall match piping and equipment connections.
- B. Water-Motor-Operated Alarm: UL 753, mechanical-operation type with pelton-wheel operator with shaft length, bearings, and sleeve to suit wall construction and 10-inch-diameter, cast-aluminum alarm gong with red-enamel factory finish. Include NPS 3/4 inlet and NPS 1 drain connections.
1. Available Manufacturers:
    - a) AFAC Inc.
    - b) Central Sprinkler Corp.
    - c) Firematic Sprinkler Devices, Inc.
    - d) Globe Fire Sprinkler Corporation.
    - e) Grinnell Fire Protection.
    - f) Reliable Automatic Sprinkler Co., Inc.
    - g) Star Sprinkler Inc.
    - h) Viking Corp.
- C. Water-Flow Indicator: UL 346, electrical-supervision, paddle-operated-type, water-flow detector with 250-psig pressure rating and designed for horizontal or vertical installation. Include two single-pole, double-throw circuit switches for isolated alarm and auxiliary contacts, 7 A, 125-V ac and 0.25 A, 24-V dc; complete with factory-set, field-adjustable retard element to prevent false signals and tamperproof cover that sends signal if removed.
1. Available Manufacturers:
    - a) ADT Security Services, Inc.
    - b) Grinnell Fire Protection.
    - c) ITT McDonnell & Miller.
    - d) Potter Electric Signal Company.

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- e) System Sensor.
  - f) Viking Corp.
  - g) Watts Industries, Inc.; Water Products Div.
- D. Pressure Switch: UL 753, electrical-supervision-type, water-flow switch with retard feature. Include single-pole, double-throw, normally closed contacts and design that operates on rising pressure and signals water flow.
- 1. Available Manufacturers:
    - a) Grinnell Fire Protection.
    - b) Potter Electric Signal Company.
    - c) System Sensor.
    - d) Viking Corp.
- E. Valve Supervisory Switch: UL 753, electrical, single-pole, double-throw switch with normally closed contacts. Include design that signals controlled valve is in other than fully open position.
- 1. Available Manufacturers:
    - a) McWane, Inc.; Kennedy Valve Div.
    - b) Potter Electric Signal Company.
    - c) System Sensor.

**2.13 PRESSURE GAGES**

- A. Available Manufacturers:
- 1. AGF Manufacturing Co.
  - 2. AMETEK, Inc.; U.S. Gauge.
  - 3. Brecco Corporation.
  - 4. Dresser Equipment Group; Instrument Div.
  - 5. Marsh Bellofram.
  - 6. WIKA Instrument Corporation.
- B. Description: UL 393, 3-1/2- to 4-1/2-inch-diameter, dial pressure gage with range of 0 to 250 psig.
- 1. Water System Piping: Include caption "WATER" or "AIR/WATER" on dial face.
  - 2. Air System Piping: Include caption "AIR" or "AIR/WATER" on dial face.

**PART 3 - EXECUTION****3.1 PREPARATION**

- A. Perform fire-hydrant flow test according to NFPA 13 and NFPA 291. Use results for system design calculations required in Part 1 "Quality Assurance" Article.
- B. Report test results promptly and in writing.

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- A. Refer to Division 2 Section "Earthwork" for excavating, trenching, and backfilling.

**3.3 EXAMINATION**

- A. Examine roughing-in for hose connections and stations to verify actual locations of piping connections before installation.
- B. Examine walls and partitions for suitable thicknesses, fire- and smoke-rated construction, framing for hose-station cabinets, and other conditions where hose connections and stations are to be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

**3.4 PIPING APPLICATIONS, GENERAL**

- A. Flanges, flanged fittings, unions, nipples, and transition and special fittings with finish and pressure ratings same as or higher than system's pressure rating may be used in above-ground applications, unless otherwise indicated.
- B. Piping between Fire Department Connections and Check Valves: Galvanized, standard-weight steel pipe.
- C. Underground Service-Entrance Piping: Ductile-iron, mechanical-joint pipe and fittings and restrained joints.

**3.5 SPRINKLER SYSTEM PIPING APPLICATIONS**

- A. Standard-Pressure, Wet-Pipe and Dry Pipe Sprinkler System, 175-psig Maximum Working Pressure with standard weight steel pipe.

**3.6 VALVE APPLICATIONS**

- A. The following requirements apply:
1. Listed Fire-Protection Valves: UL listed and FMG approved for applications where required by NFPA 13.
    - a) Shutoff Duty: Use ball, butterfly, or gate valves.
  2. Unlisted General-Duty Valves: For applications where UL-listed and FMG-approved valves are not required by NFPA 13.
    - a) Shutoff Duty: Use ball, butterfly, or gate valves.
    - b) Throttling Duty: Use ball or globe valves.

**3.7 JOINT CONSTRUCTION**

- A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping joint construction.
- B. Threaded Joints: Comply with NFPA 13 for pipe thickness and threads. Do not thread pipe smaller than NPS 8 (DN 200) with wall thickness less than Schedule 40 unless approved by authorities having jurisdiction and threads are checked by a ring gage and comply with ASME B1.20.1.

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- C. Twist-Locked Joints: Insert plain-end piping into locking-lug fitting and rotate retainer lug one-quarter turn.
- D. Pressure-Sealed Joints: Use UL-listed tool and procedure. Include use of specific equipment, pressure-sealing tool, and accessories.
- E. Mechanically Formed, Copper-Tube-Outlet Joints: Use UL-listed tool and procedure. Drill pilot hole in copper tube, form branch for collar, dimple tube to form seating stop, and braze branch tube into formed-collar outlet.
- F. Grooved Joints: Assemble joints with listed coupling and gasket, lubricant, and bolts.
  - 1. Ductile-Iron Pipe: Radius-cut-groove ends of piping. Use grooved-end fittings and grooved-end-pipe couplings.
  - 2. Steel Pipe: Square-cut or roll-groove piping as indicated. Use grooved-end fittings and rigid, grooved-end-pipe couplings, unless otherwise indicated.
  - 3. Copper Tube: Roll-groove tubing. Use grooved-end fittings and grooved-end-tube couplings.
  - 4. Dry-Pipe Systems: Use fittings and gaskets listed for dry-pipe service.

**3.8 SERVICE-ENTRANCE PIPING**

- A. Connect fire-suppression piping to water-service piping of size and in location indicated for service entrance to building.

**3.9 PIPING INSTALLATION**

- A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping installation.
- B. Install underground ductile-iron service-entrance piping according to NFPA 24 and with restrained joints.
- C. Use approved fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.
- D. Install unions adjacent to each valve in pipes NPS 2 and smaller. Unions are not required on flanged devices or in piping installations using grooved joints.
- E. Install flanges or flange adapters on valves, apparatus, and equipment having NPS 2-1/2 and larger connections.
- F. Install "Inspector's Test Connections" in sprinkler system piping, complete with shutoff valve, sized and located according to NFPA 13.
- G. Install sprinkler piping with drains for complete system drainage.
- H. Install ball drip valves to drain piping between fire department connections and check valves. Drain to floor drain or outside building.
- I. Install alarm devices in piping systems.
- J. Hangers and Supports: Comply with NFPA 13 for hanger materials.

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1. Install sprinkler system piping according to NFPA 13.
- K. Install pressure gages on riser or feed main, at each sprinkler test connection, and at top of each standpipe. Include pressure gages with connection not less than NPS 1/4 and with soft metal seated globe valve, arranged for draining pipe between gage and valve. Install gages to permit removal, and install where they will not be subject to freezing.
- L. Drain dry-pipe sprinkler piping.
- M. Pressurize and check dry-pipe sprinkler system piping and air compressors.
- N. Fill wet-pipe sprinkler system piping with water.

**3.10 VALVE INSTALLATION**

- A. Install listed fire-protection valves, unlisted general-duty valves, specialty valves and trim, controls, and specialties according to NFPA 13 and authorities having jurisdiction.
- B. Install listed fire-protection shutoff valves supervised-open, located to control sources of water supply except from fire department connections. Install permanent identification signs indicating portion of system controlled by each valve.
- C. Install check valve in each water-supply connection. Install backflow preventers instead of check valves in potable-water supply sources.
- D. Specialty Valves:
  1. Alarm Check Valves: Install in vertical position for proper direction of flow, including bypass check valve and retarding chamber drain-line connection.
  2. Dry-Pipe Valves: Install trim sets for air supply, drain, priming level, alarm connections, ball drip valves, pressure gages, priming chamber attachment, and fill-line attachment.
    - a) Air-Pressure Maintenance Devices for Dry-Pipe Systems: Install shutoff valves to permit servicing without shutting down sprinkler system; bypass valve for quick system filling; pressure regulator or switch to maintain system pressure; strainer; pressure ratings with 14 to 60 psig adjustable range; and 175 psig maximum inlet pressure.
    - b) Install air compressor and compressed-air supply piping.
  3. Deluge Valves: Install in vertical position, in proper direction of flow, in main supply to deluge system.

**3.11 SPRINKLER APPLICATIONS**

- A. Use the following sprinkler types:
  1. Rooms without Ceilings: Upright sprinklers.
  2. Rooms with Suspended Ceilings: Pendent sprinklers
  3. Wall Mounting: Sidewall sprinklers.
  4. Sprinkler Finishes:

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- a) Upright, Pendent, and Sidewall Sprinklers: Chrome plated in finished spaces exposed to view; rough bronze in unfinished spaces not exposed to view; wax coated where exposed to acids, chemicals, or other corrosive fumes.

**3.12 SPRINKLER INSTALLATION**

- A. Install sprinklers in suspended ceilings in center of acoustical ceiling panels and tiles.

**3.13 HOSE-STATION INSTALLATION**

- A. Install NPS 2-1/2 hose connections with quick-disconnect NPS 2-1/2 by NPS 1-1/2 reducer adapter and flow-restricting device, unless otherwise indicated.
- B. Install freestanding hose stations with support or bracket attached to standpipe or substrate.
- C. Install wall-mounting, rack-type hose.
- D. Install hose-reel hose stations on wall with bracket attached to substrate.

**3.14 FIRE DEPARTMENT CONNECTION INSTALLATION**

- A. Install wall-type, fire department connections in vertical wall.
- B. Install ball drip valve at each check valve for fire department connection.

**3.15 CONNECTIONS**

- A. Install piping adjacent to equipment to allow service and maintenance.
- B. Connect water-supply piping to fire-suppression piping.
- C. Install ball drip valves at each check valve for fire department connection. Drain to floor drain or outside building.
- D. Connect piping to specialty valves, hose valves, specialties, fire department connections, and accessories.
- E. Connect compressed-air supply to dry-pipe sprinkler piping.
- F. Connect air compressor to the following piping and wiring:
  - 1. Pressure gages and controls.
  - 2. Electrical power system.
  - 3. Fire alarm devices, including low-pressure alarm.
- G. Electrical Connections: Power wiring is specified in Division 16.
- H. Connect alarm devices to fire alarm.
- I. Ground equipment according to Division 16 Section "Grounding and Bonding."
- J. Connect wiring according to Division 16 Section "Conductors and Cables."

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- K. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

**3.16 LABELING AND IDENTIFICATION**

- A. Install labeling and pipe markers on equipment and piping according to requirements in NFPA 13 and in Division 15 Section "Mechanical Identification."

**3.17 FIELD QUALITY CONTROL**

- A. Perform the following field tests and inspections and prepare test reports:
  - 1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
  - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
  - 3. Energize circuits to electrical equipment and devices.
  - 4. Start and run air compressor.
  - 5. Flush, test, and inspect sprinkler systems according to NFPA 13, "Systems Acceptance" Chapter.
  - 6. Flush, test, and inspect standpipe systems according to NFPA 14, "System Acceptance" Chapter.
  - 7. Coordinate with fire alarm tests. Operate as required.
  - 8. Verify that equipment hose threads are same as local fire department equipment.
- B. Report test results promptly and in writing to Engineer and authorities having jurisdiction.

**3.18 CLEANING AND PROTECTION**

- A. Clean dirt and debris from sprinklers.
- B. Remove and replace sprinklers with paint other than factory finish.
- C. Protect sprinklers from damage until Substantial Completion.

**3.19 DEMONSTRATION**

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain specialty valves.

END OF SECTION 13915